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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Docket No. DKT 99083

In the Application of:

JOHN A. HUMMEL ET AL.

U.S. Serial No.: 09/840,434

Filed: APRIL 23, 2001

For: BACK DRIVE SILENT CHAIN
SYSTEM WITH LOW PROFILE
SPROCKET

Examiner: VICKY A. JOHNSON

Group Art Unit: 3682

EXPRESS MAIL LABEL NO.: EV303833148US

Date: AUGUST 23, 2004

BRIEF ON APPEAL

Mail Stop Appeal Brief - Patents
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an appeal from an Office Action dated January 13, 2004 ("Office Action"), in which claims 1-9 were finally rejected.

REAL PARTY IN INTEREST

Borg Warner Inc. a corporation organized under the laws of the state of Delaware has acquired the entire right, title and interest in and to the invention, the application, and any and all

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patents to be obtained therefor, as set forth in the Assignment filed with the patent application and recorded on Reel 011733, frame 0256.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

STATUS OF THE CLAIMS

Claims 1-9 are pending in the present application. Pending claims 1-6 and 9 have been rejected under 35 U.S.C. §102(b) and claims 7 and 8 have been rejected under 35 U.S.C. §103(a). Claims 1-9 are the subject of this appeal.

STATUS OF THE AMENDMENTS

No amendment has been filed subsequent to the appealed final rejection.

SUMMARY OF THE INVENTION

The invention disclosed by this Application is directed to a power transmission chain that drives a sprocket. Similar to conventional power transmission chains and sprockets, a chain according to the present invention is formed by a series of interleaved rows of links that engage a sprocket for driving engagement. Unlike conventional and prior art chains and sprockets, driving engagement of a chain and sprocket according to the present invention is achieved with a sprocket that, in accordance with the present invention, has low profile protrusions that are spaced along the periphery of the sprocket and with a chain that, in accordance with the present invention, has links that are formed for driving engagement with the low profile protrusions of the sprocket either by links that contact the sprocket along a substantial majority a link surface that is positioned to overlies a sprocket protrusion, or by links that contact the sprocket along a

substantial majority of a link surface positioned to overlies adjacent surfaces of adjacent protrusions. Rather than conventional driving engagement by contacting dissimilar chain link and sprocket geometries, such as by teeth that are formed by the chain and sprocket, a chain and sprocket according to the present invention achieves driving engagement through conforming geometry and contact along a surface of substantial length along the chain link and sprocket as required by all claims at issue.

One advantage of a chain and sprocket according to the present invention is that the surface of the chain that engages the sprocket may contact a conventional chain tensioner. The extended contacting surface of the chain link, unlike conventional irregular high profile teeth, promotes sliding contact of the links on a chain tensioner and diminishes the abrupt impact that is characteristic of conventional and irregularly shaped chain teeth and tensioner contact arrangements. The arrangement according to the present invention results in lower chain noise and improved system wear and vibration characteristics while avoiding the need for costly additional chain links to accomplish the sliding contact.

ISSUES FOR REVIEW

I. Are claims 1-6 and 9 unpatentable as being anticipated under 35 U.S.C. § 102(b) over Ichikawa et al. (Ichikawa), BOTH-SIDE MESHING TYPE SILENT CHAIN, November 23, 1999, U.S. Patent Number 5,989,140?

II. Are claims 7 and 8 unpatentable as being obvious under 35 U.S.C. § 103(a) over Ichikawa et al., U.S. Patent Number 5,989,140, in view of Aydelott (Aydelott) COG LINK FOR CHAINS, U.S. Patent Number 270,723?

GROUPING OF CLAIMS

Claims 1 through 6 and 9 rise or fall together, and claims 7 and 8 rise or fall together.

ARGUMENT

I. Claims 1-6 and 9 are not anticipated under 35 U.S.C. § 102(b) by Ichikawa because Ichikawa fails to disclose extended contact of chain links with a sprocket.

Claims 1-6 and 9 were rejected by the Office Action, under 35 U.S.C. § 102(b) as being unpatentable over Ichikawa.

35 U.S.C. 102(b) states:

A person shall be entitled to a patent unless ... the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States,

The Federal Circuit has set out the standard for anticipation rejections under section 102:

A determination that a claim is invalid as being anticipated or lacking novelty under 35 U.S.C. § 102 requires a finding that “each and every limitations is found either expressly or inherently in a single prior art reference.” *Oakley, Inc. v. Sunglass Hut Int’l*, 316 F.3d 1331, 1339, 65 USPQ2d 1321, 1325 (Fed. Cir. 2003) (citation omitted).

Every element of the claimed invention must be literally present arranged as in the claim”. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

There must be no difference between the claimed invention and the reference disclosure, as viewed by a person having ordinary skill in the art. *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 927 F.2d 1565, 1576, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991).

Independent claim 1 is directed to a silent chain and sprocket assembly comprising a sprocket having a plurality of low profile protrusions extending outwardly from the sprocket at locations spaced along an outer periphery of the sprocket. The assembly also comprises a silent chain having a series of inner link rows lying along a chain direction and a series of outer link rows. An outer link row is between adjacent inner link rows and interleaved at opposite ends of the outer link row along the chain direction with the adjacent inner link rows. The assembly also comprises adjacent inner and outer link rows being joined to each other by members extending

through interleaved portions of adjacent inner and outer link rows forming a rotatable joint between the adjacent inner and outer link rows. Claim 1 further requires that:

the links of said inner and outer link rows form a surface that extends along the chain direction of the links a distance that approximates the distance from a center of a member joining the link to one adjacent row of links to a center of a member joining the link to another adjacent row of links, **overlies the sprocket protrusions and contacts said low profile protrusions along at least the majority of the length of the surface for driving contact with the low profile protrusions;** and

the link surface extending along the chain direction a distance substantially the length of the link along the chain direction.

(Emphasis added.)

Independent claim 5 is directed to a silent chain and sprocket assembly comprising a front-side sprocket. The front-side sprocket having a plurality of teeth spaced about an outer periphery of the front-side sprocket. The assembly also comprises a back-side sprocket. The back-side sprocket having a plurality of low profile protrusions spaced about an outer periphery of the back-side sprocket. The assembly also comprises a silent chain having a front-side and a back-side. The front-side of the chain engaging the front-side sprocket and the back-side of the chain engaging the back-side sprocket. The chain has link plates forming inner and outer link rows. The inner and outer link rows are interleaved along a chain direction. The link plates have a front side at the front-side of the chain and a back-side at the back-side of the chain. The link plates form two apertures spaced along the chain direction. The link plates form two teeth to engage a tooth of the front-side sprocket at an end of the link along the chain direction, to engage a second tooth at another end of the link along the chain direction, and to engage a third tooth immediate the teeth at the ends of the link plate. Claim 5 also requires that:

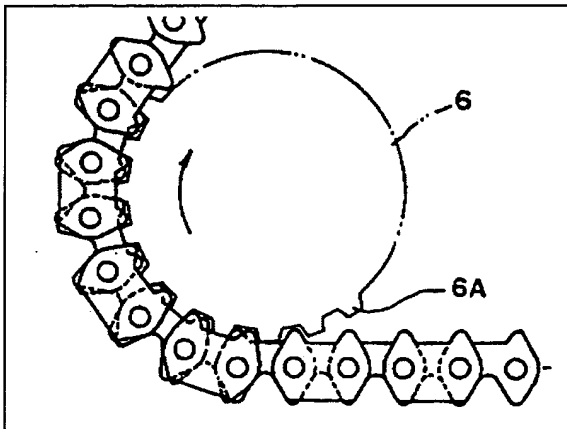
the link plates defining a back-side surface that **contacts a portion of the back-side sprocket along at least the majority of a distance substantially equal to a length of the link plates along the chain direction.**

(Emphasis added.)

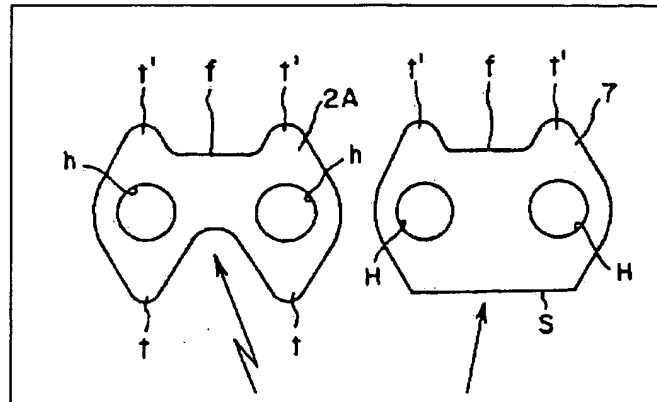
Paragraph 2 of the Office Action states that Ichikawa discloses a chain having a surface that defines two teeth, that the surface overlies and contacts sprocket protrusions, and that the sides of the teeth meet the protrusion. The rejection fails to address the requirements of the claim to the extent that it does not state that the any surface of a link disclosed by Ichikawa, even including the teeth as stated in the Office action, contacts a sprocket protrusion along a majority of the length of the surface, as required by independent claim 1, or that the link surface is of a distance that is substantially the length of the link, as required by independent claim 5. The rejection does not address the substance of those two independent claims.

The appealed rejection of the Office Action does not state that Ichikawa discloses a chain that meets the requirement of claim 1 for a link surface “that approximates the distance from a center of a member joining the link to one adjacent row of links to a center of a member joining the link to another adjacent row of links, overlies the sprocket protrusions and contacts said low profile protrusions along at least the majority of the length of the surface”. The Office Action also does not state that Ichikawa discloses a chain that meets the requirement of claim 5 for a link “surface that contacts a portion of the back-side sprocket along at least the majority of a distance substantially equal to a length of the link plates along the chain direction.” Those rejections do not establish or meet the standard for anticipation with respect to the Appellants’ claimed invention. See MPEP § 706.02(a). The Appellants respectfully assert that Ichikawa fails to disclose a chain that meeting the requirements.

Ichikawa does anticipate either claim one or claim five because it does not disclose a chain and sprocket that meets the requirements for substantial contact of either claim 1 or claim 5. Ichikawa discloses a chain that engages a sprocket 6 having teeth with arcuate tops 6A. Fig. 1 (excerpt reproduced below), col. 4 lines 24 – 33. Links (articular train plates 2A and guide plates 7) have a flat surface f that contacts that arcuate tops 6A. Fig. 3 (excerpt reproduced below), col. 4, lines 24-33.



Ichikawa et al. Fig. 1 Excerpt



Ichikawa et al. Fig. 3 Excerpt

Based on elementary geometry, it is clear that contact between the arcuate sprocket surface 6A and the flat link surface f cannot meet the requirement of claim 1 that a link surface “that approximates the distance from a center of a member joining the link to one adjacent row of links to a center of a member joining the link to another adjacent row of links, overlies the sprocket protrusions and **contacts said low profile protrusions along at least the majority of the length of the surface**”. Similarly, that contact cannot meet the requirement of claim 5 that a link “surface that **contacts a portion of the back-side sprocket along at least the majority of a distance substantially equal to a length of the link plates along the chain direction.**”

If the link surfaces requirements of claims 1 and 5 are construed to encompass the “sub-teeth t'” as well as the surface f, Ichikawa would still not disclose the required length of contact. Further, Ichikawa would also not meet the requirement of claim 1 that contact be along “the majority of the length of the surface for driving contact with the low profile protrusions.”

Ichikawa et al. makes clear that the sub-teeth t' engage the teeth of sprocket 6. Col. 2, lines 40 – 42, 54 – 58. However, Ichikawa et al. does not state that the sub-teeth t' contact the same tooth that forms the arcuate surface 6A that contacts the surface f between the sub-teeth t'. Fig. 1 makes clear that the sub-teeth t' do not contact the tooth that supports the train plate 2A or guide plate 7. Rather, outside surfaces of sub-teeth t', that is surfaces opposite the surface f, contact teeth of sprocket 6 that are adjacent to the tooth that supports the train plate or guide plate. Therefore, even assuming that the surface f and adjacent sub-teeth t' of the train plates and guide plates of Ichikawa et al. can properly be considered a surface as required by claims 1 and 5, Ichikawa et al. does not disclose contact with a supporting tooth other than a flat surface f contacting an arcuate top 6A. That contact is not along a majority of the surface as required by claim 1 and is not a majority of a distance substantially equal to a length of the link plate as required by claim 5. Rejection of claims 1 through 6 and 9 under 35 U.S.C. §102(b) should be reversed.

The Appellants' chain is adapted to operate via contact with low profile protrusions along at least the majority of the length of the surface providing driving contact with the low profile protrusions (claim 1) and that a back-side surface of the chain contacts a portion of the back-side sprocket along at least a majority of a distance substantially equal to a length of the link plates along the chain direction (claim 5). The Appellants respectfully assert that Ichikawa fails to teach, suggest, or disclose these features. The Appellants assert that independent claims 1 and 5 are allowable over Ichikawa. Rejection of independent claims 1 and 5 under 35 U.S.C. § 102(b) should be reversed.

Claims 2-4 depend from independent claim 1 and claims 6 and 9 depend from claim 5. Claims 2-4, 6, and 9 include all the requirements of independent claims from which they depend and also additional claim requirements. Because independent claims 1 and 5 are allowable over Ichikawa, the Appellants respectfully assert that claims 2-4, 6 and 9, which depend from one of those independent claims, are also allowable over Ichikawa. Rejection of dependent claims 2-4, 6 and 9 under 35 U.S.C. § 102(b) should be reversed.

II. Claims 7 and 8 are not obvious under 35 U.S.C. § 103(a) over Ichikawa in view of Aydelott because the proposed combination of references fails to teach, suggest or disclose the “generally flat” sprocket surfaces required by those claims.

The Office Action rejects claims 7 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Ichikawa in view of Aydelott. 35 U.S.C. §103(a) provides that

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

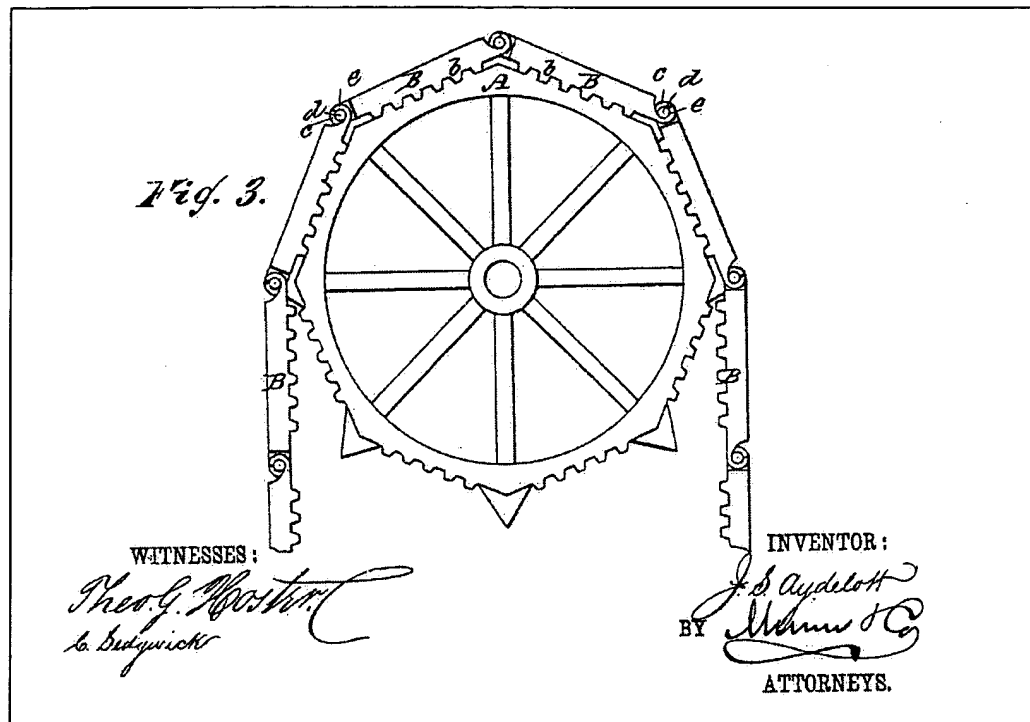
“To establish a *prima facie* case of obviousness, the Board must, *inter alia*, show ‘some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references.’” *In re Thrift*, 298 F.3d 1357, 1363, 63 USPQ2d 2002, 2006 (Fed. Cir. 2002). “When the references cited by the examiner fail to establish a *prima facie* case of obviousness, the rejection is improper and will be overturned.” *In re Brouwer*, 77 F.3d 422, 425, 37 USPQ2d 1663, 1666 (Fed. Cir. 1996).

Dependent claims 7 and 8 depend from independent claim 5. As an initial matter, The Appellants respectfully assert that any proposed combination of Ichikawa and Aydelott fails to render claims 7 and 8 unpatentable for obviousness because, as set out above, Ichikawa fails to teach, suggest, or disclose each and every feature set forth in independent claim 5.

With respect to the additional limitations of claims 7 and 8, the Office Action acknowledges that Ichikawa does not disclose a sprocket wherein “sprocket surfaces are generally flat” as required by claim 7 or a sprocket wherein “sprocket surfaces are generally flat between the first and second ends, and that extend outwardly from the back-side sprocket near their first and second ends” as required by claim 8. To meet these requirements, the Office Action relies on Aydelott, stating that it discloses back side sprocket surfaces being generally flat

and extending from the sprocket near first and second ends. That statement badly misapprehends the disclosure of Aydelott.

Aydelott, a patent dated January 16, 1883, discloses a “cog link” for forming an endless chain. Aydelott does not disclose link plates forming interleaved rows as required by



independent claim 5 from which both claims 7 and 8 depend. Aydelott also does not disclose links forming two teeth on one side of the chain and a back side surface that engages a sprocket. Rather, Aydelott discloses straight cog links that each form 6 teeth (cogs, lines 57 - 58) that engage “a series of straight toothed surfaces” of a sprocket. Line 50. As illustrated by Fig. 3 from that patent, the disclosed sprocket has surfaces that are “toothed.”

Applicants submit that “toothed surfaces” of Aydelott are specifically formed so that they are not the “generally flat” surfaces as required by claims 7 and 8, an example of which is shown by Figure 5 of the Application.

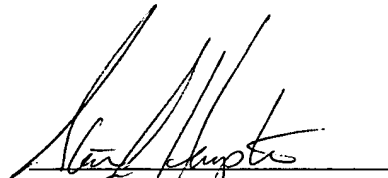
The rejection of claims 7 and 8 should be reversed based on the admitted failure of Ichikawa and the clear failure of Aydelott to teach the "generally flat" sprocket surfaces required by both claims 7 and 8.

CONCLUSION

For the foregoing reasons, claims 1-9 are distinguishable over the prior art of record. Reversal of the Office Action's rejections and issuance of a patent on the application are therefore respectfully requested.

Dated: August 13, 2004

Respectfully submitted,



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APPENDIX

(37 C.F.R. § 1.192(c)(9))

The following claims are involved in this appeal:

1. (Previously amended): A silent chain and sprocket assembly comprising:
a sprocket having a plurality of low profile protrusions extending outwardly from said sprocket at locations spaced along an outer periphery of the sprocket;

a silent chain having a series of inner link rows lying along a chain direction and a series of outer link rows, an outer link row between adjacent inner link rows and interleaved at opposite ends of the outer link row along the chain direction with the adjacent inner link rows;

adjacent inner and outer link rows are joined to each other by members extending through interleaved portions of adjacent inner and outer link rows to form a rotatable joint between the adjacent inner and outer link rows;

the links of said inner and outer link rows form a surface that extends along the chain direction of the links a distance that approximates the distance from a center of a member joining the link to one adjacent row of links to a center of a member joining the link to another adjacent row of links, overlies the sprocket protrusions and contacts said low profile protrusions along at least the majority of the length of the surface for driving contact with the low profile protrusions; and

the link surface extending along the chain direction a distance substantially the length of the link along the chain direction.
2. (Original): The silent chain and sprocket assembly of claim 1 wherein the surface of the links that is sized to overlie the low profile protrusions of the sprocket is at a back-side of the chain.
3. (Original): The silent chain and sprocket assembly of claim 2 wherein the links have a surface that defines two teeth extending from the link at a front-side of the chain.

4. (Original): The silent chain and sprocket assembly of claim 1 wherein the surface that overlies the sprocket protrusions extends along the chain direction of the links a distance that approximates the distance from a center of a member joining the link to one adjacent row of links to a center of a member joining the link to another adjacent row of links.

5. (Previously amended): A silent chain and sprocket assembly comprising:

a front-side sprocket, said front-side sprocket having a plurality of teeth spaced about an outer periphery of said front-side sprocket;

a back-side sprocket, said back-side sprocket having a plurality of low profile protrusions spaced about an outer periphery of said back-side sprocket;

a silent chain having a front-side and a back-side, said front-side of said chain engaging said front-side sprocket and said back-side of said chain engaging said back-side sprocket;

the chain having link plates forming inner and outer link rows, said inner and outer link rows interleaved along a chain direction;

the link plates having a front-side at the front-side of the chain, and a back-side at the back-side of the chain;

the link plates forming two apertures spaced along the chain direction;

the link plates forming two teeth to engage a tooth of said front-side sprocket at an end of the link along the chain direction, to engage a second tooth at another end of the link along the chain direction, and to engage a third tooth intermediate the teeth at the ends of the link plate;

the link plates defining a back-side surface that contacts a portion of the back-side sprocket along at least the majority of a distance substantially equal to a length of the link plates along the chain direction.

6. (Original): The silent chain and sprocket assembly of claim 5 wherein the low profile protrusions of the back-side sprocket are formed by two sprocket surfaces that meet at the protrusion and extend oppositely from each other along the periphery of the back-side sprocket from a first end to a second end a distance that is approximately the length of the back-side surface of the link plates.
7. (Original): The silent chain and sprocket assembly of claim 6 wherein the back-side sprocket surfaces are generally flat.
8. (Original): The silent chain and sprocket assembly of claim 6 wherein the back-side sprocket surfaces are generally flat between the first and second ends, and that extend outwardly from the back-side sprocket near their first and second ends.
9. (Previously amended): The silent chain and sprocket assembly of claim 5 wherein the back-side surfaces of the link plates closely conform to the low profile protrusions along the back-side sprocket, to the back-side surfaces of the link plates formed to extend along the periphery of the sprocket to overlie a protrusion.